

Irrigated Lands Regulatory Program Monitoring Surface Water & Groundwater



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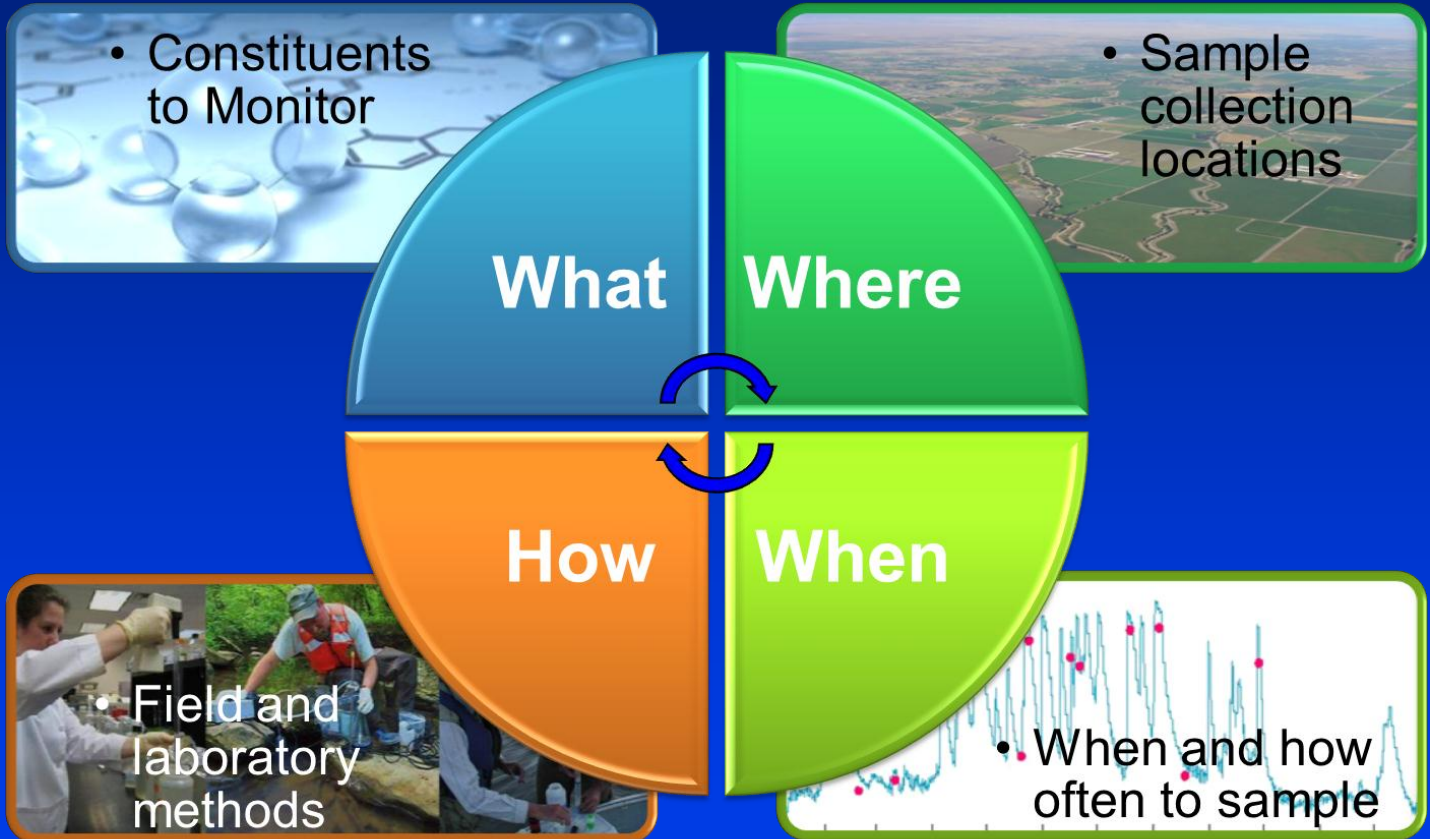
Presentation Contents

- Why Monitor?
- Monitoring Strategy
- Surface Water Monitoring
- Groundwater Monitoring

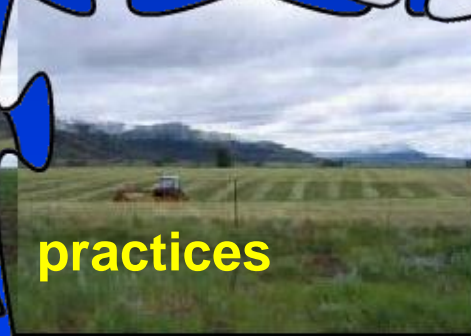
Why Monitor?

- Evaluate WDR, Basin Plan, and Clean Water Act compliance
- Ensure beneficial uses protected
- Assess impacts of discharges
- Evaluate control measures
- Identify pollutant sources

Monitoring Strategy



Compliance Assessment



SURFACE WATER MONITORING



Sources of Surface Water Discharge



Monitoring Considerations

- Facility/project-specific vs. multiple operations
- Defined vs. Dispersed discharge points
- Predictable vs. Uncertain pollutants/pathways
- Need for information vs. cost

Central Valley

Irrigated Agriculture

- ~7.5 million acres
- ~33,000 individual operations
- Numerous discharge locations



Irrigated Agriculture Monitoring Considerations



Monitoring Considerations



NPDES Wastewater Program

Monitoring Considerations

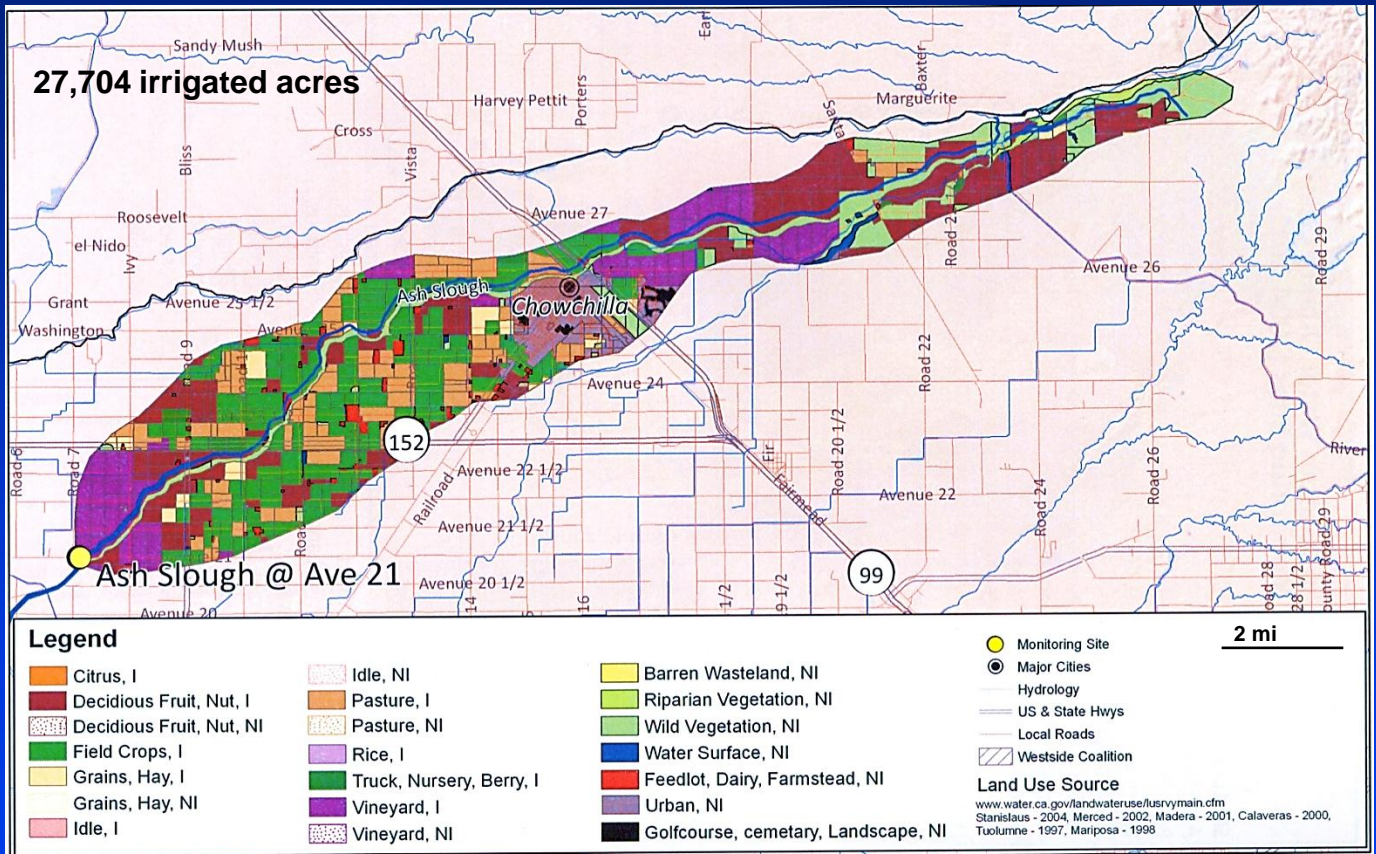


Stormwater Construction General Permit

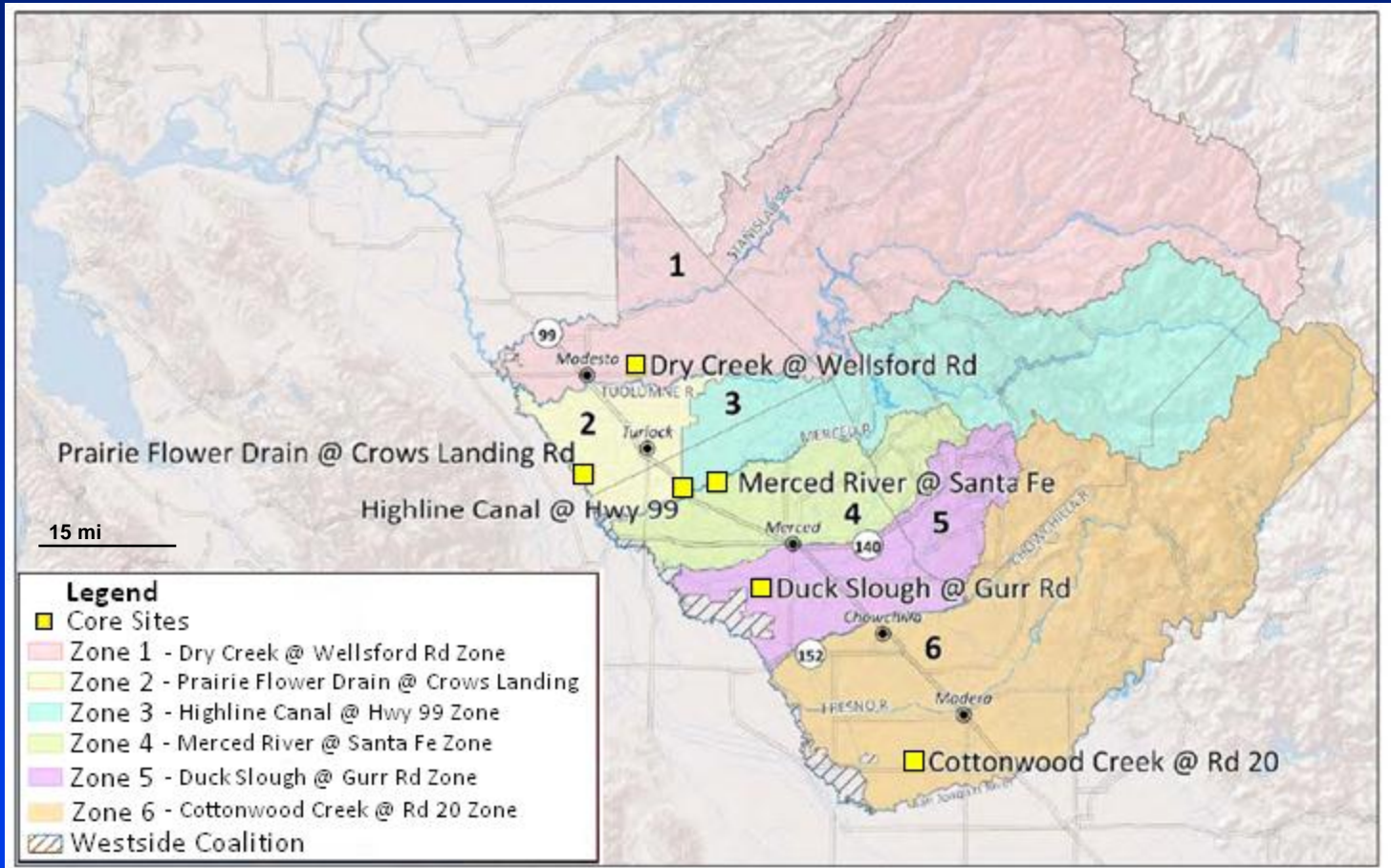
Feasible and Effective Monitoring Approaches

	Number	Effluent Monitoring	Receiving Water Monitoring
Wastewater Treatment Plants	~200	✓	✓ Facility specific
Construction Sites	~2,000	✓	<i>none</i>
Agricultural Operations	~33,000	<i>none</i>	✓ Regional

Surface Water Approach



East San Joaquin Strategy



Surface Water Summary

- Monitoring required to:
 - ◆ Evaluate compliance
 - ◆ Assess impacts of discharges
 - ◆ Evaluate management practice effectiveness
- Regional monitoring strategy is most feasible
 - ◆ Advantages and disadvantages

Questions?



Groundwater Monitoring



Clay Rodgers
Assistant Executive Officer

Groundwater Presentation Overview

- Introduction
- Groundwater Monitoring Programs
- Proposed ILRP Groundwater Monitoring

Central Valley Groundwater Facts

- Largest Groundwater Basin in California
- >50% Drinking water, sole source for some



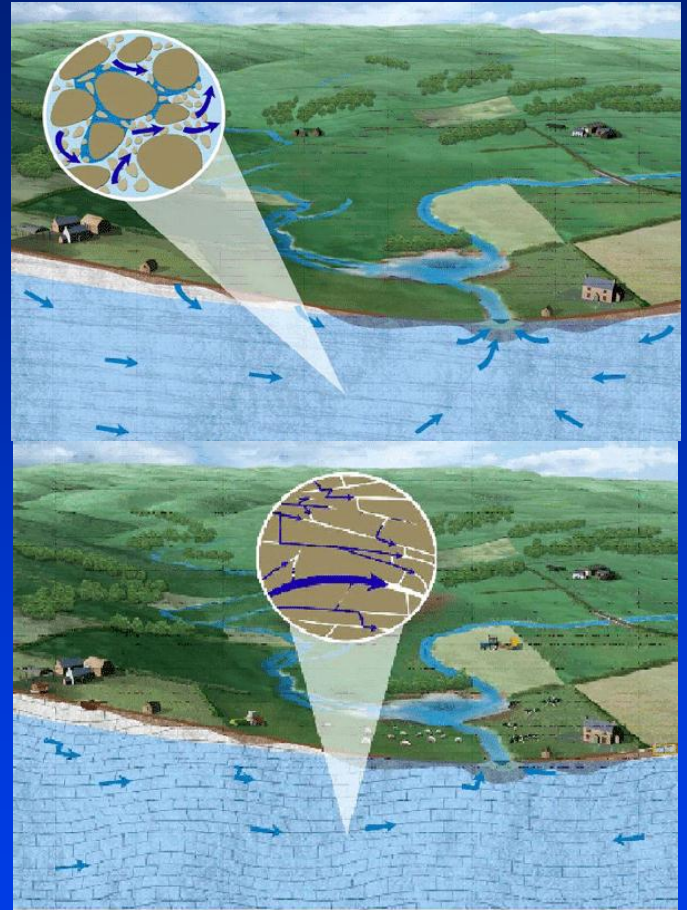
Central Valley Discharger Facts

- >80% of Irrigated Ag
- >80% of Dairies
- 50% of Land Disposal
- 40% of Septic Systems

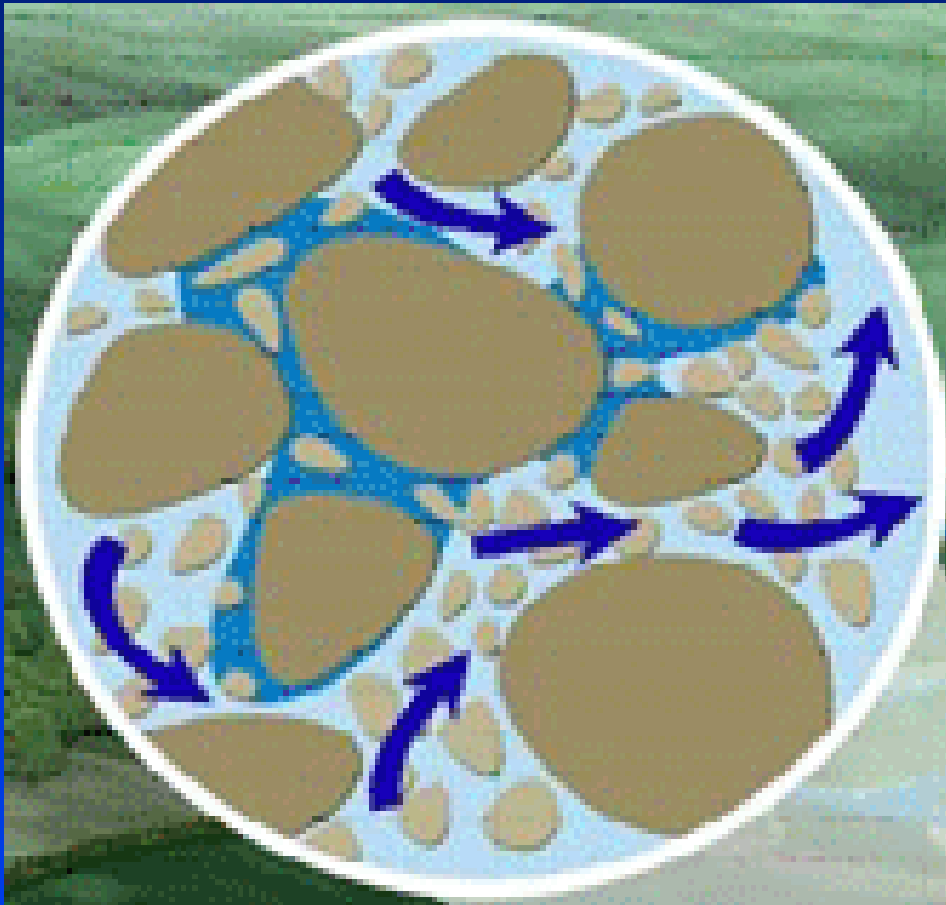


Groundwater Occurrence

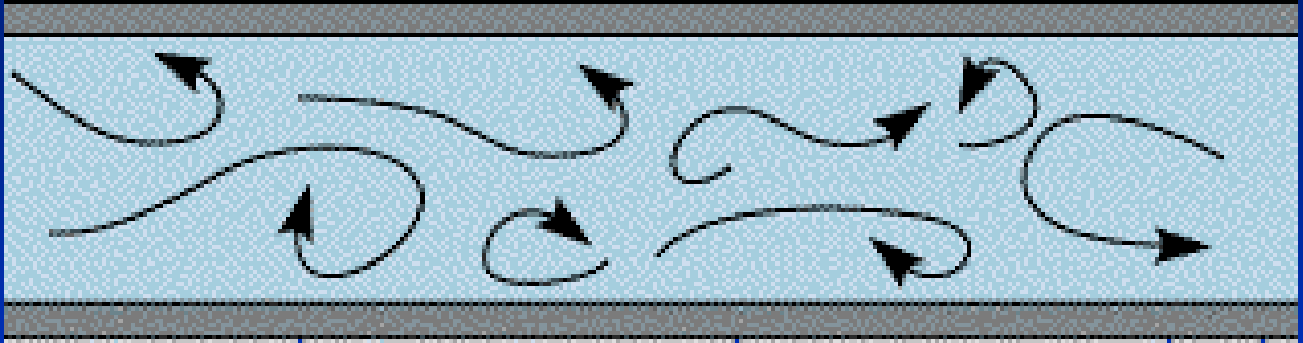
- Porous Media
- Fractured Rock



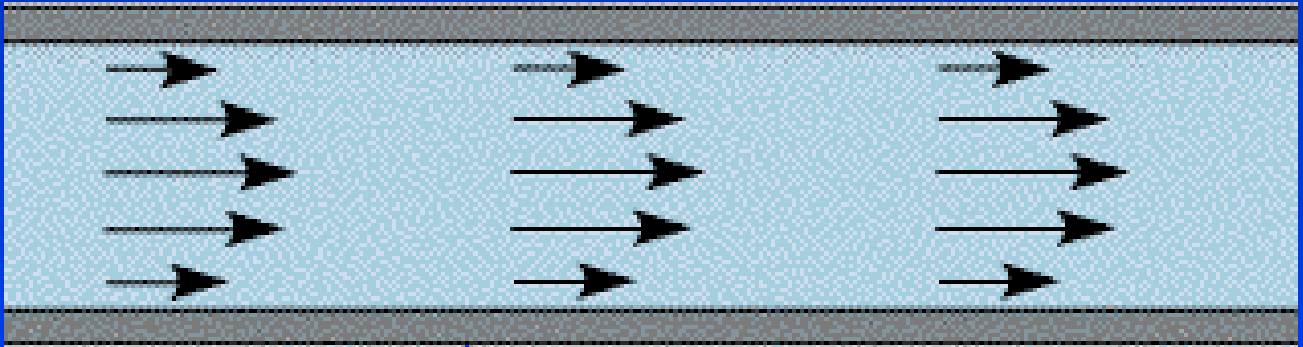
Groundwater Movement



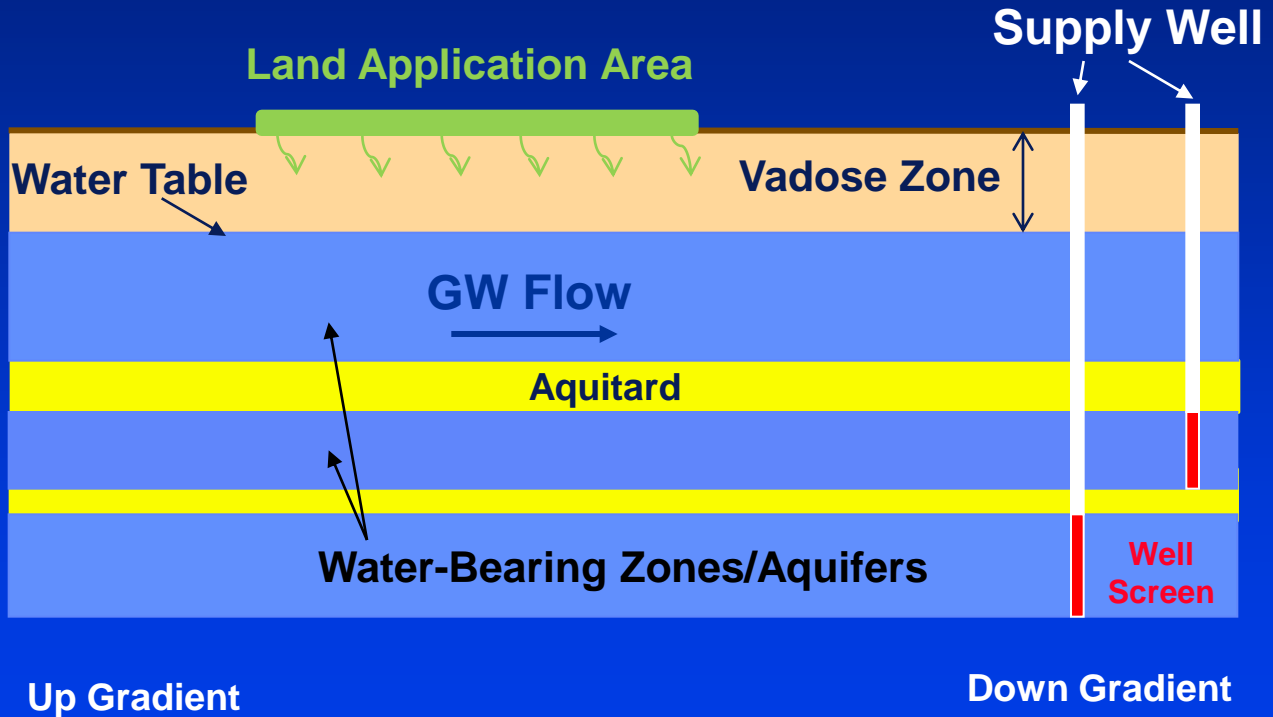
Turbulent Flow



Laminar Flow



Hydrogeologic Cross Section



Groundwater and Surface Water Differences

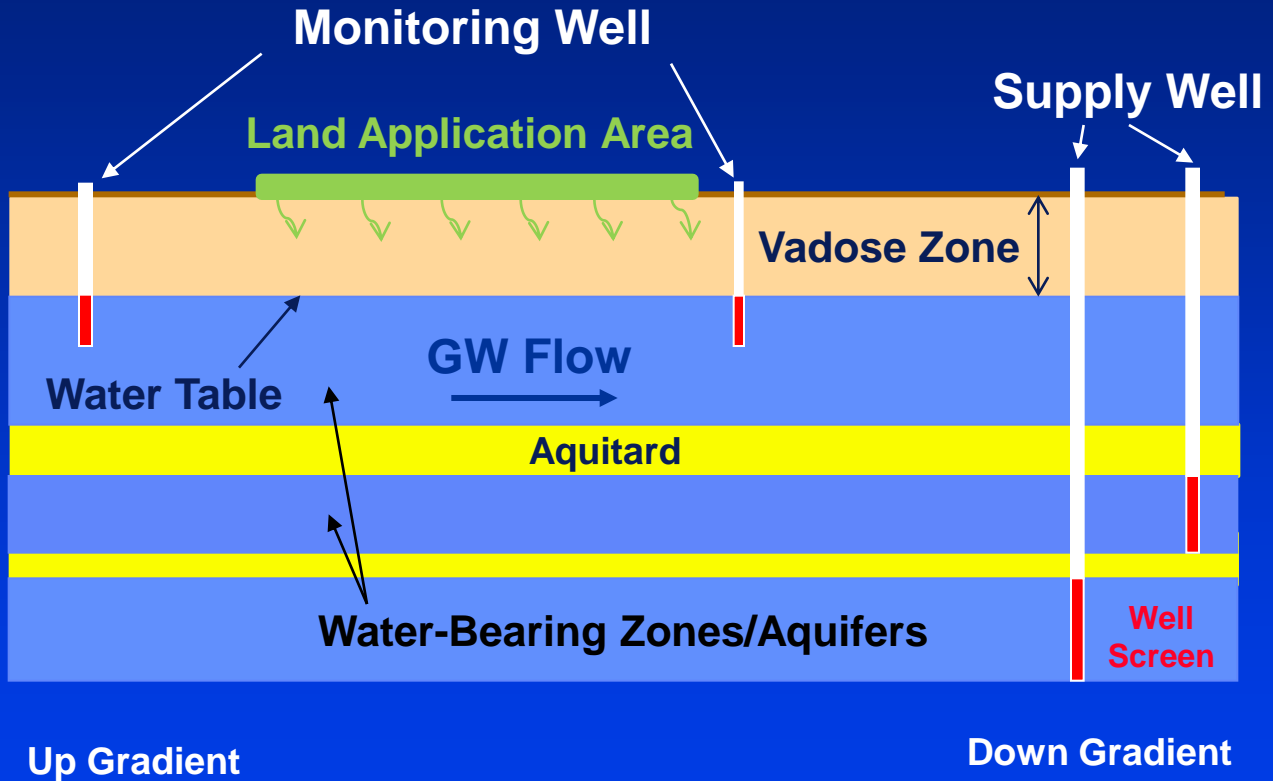
- Mixing
- Flow Rate
- Flow Direction
- Vadose Zone

Central Valley Water Board

Groundwater Programs

- Underground Storage Tanks
- Site Cleanup/DOD
- Title 27/Hazardous Disposal Site
- WDR (formerly non-15)
- Confined Animals
- Irrigated Lands

Where Should We Monitor?



Dairy General Order Groundwater Monitoring

- Water Supply Well Monitoring
- Individual Monitoring
- Representative Monitoring

What is Representative Monitoring?

- Primary purpose is to ID what combination of practices and site conditions are protective of water quality
- Limited number of sites
- Extrapolate/interpolate data to sites not monitored
- Should lead to filling out the following matrix

Groundwater Matrix

Less Protective Practices



Less
Protective
Conditions



1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24

Representative Monitoring Advantages

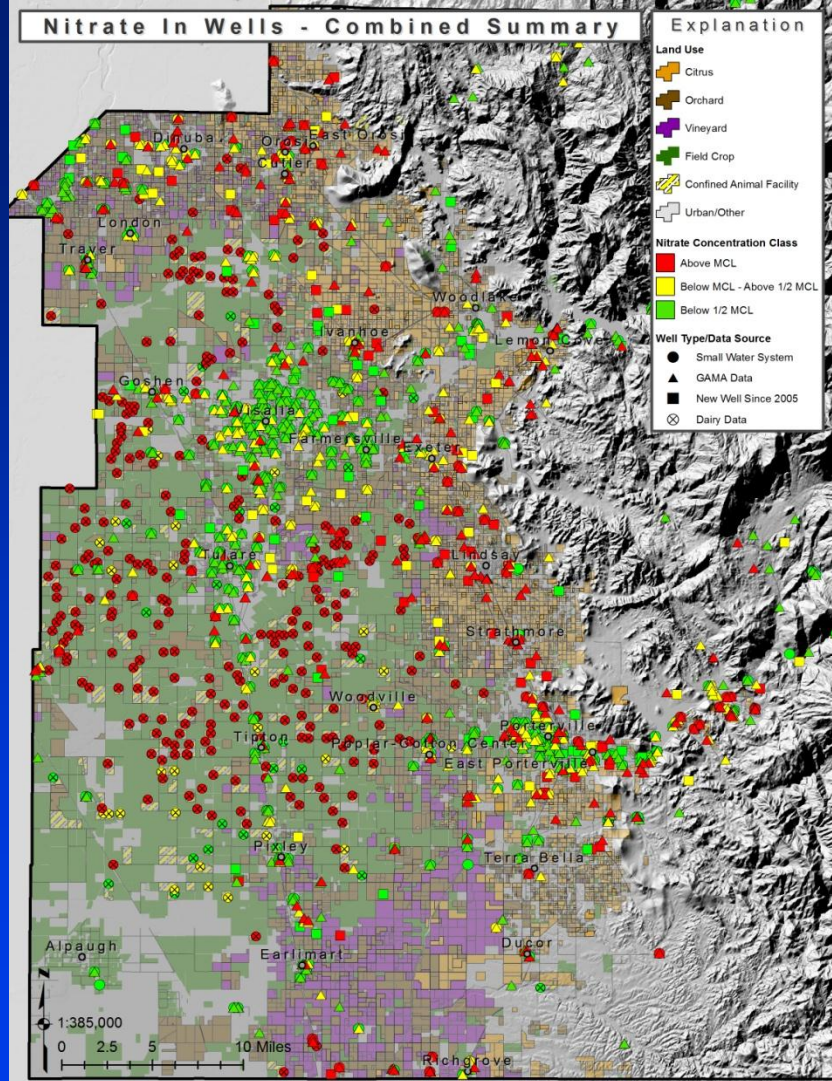
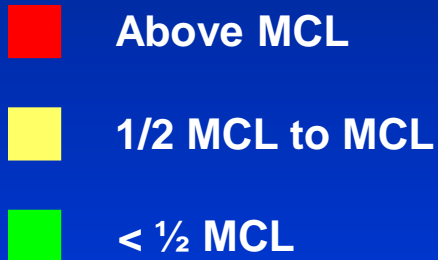
- More Efficient Use of Resources
- More Detailed Data Evaluation
- Consistent Quality of Work
- Establish Protective Practices
Based on Data

Representative Monitoring Disadvantages

- No Monitoring Data for Most Sites
- Acceptance of Results

Why Should We Monitor Groundwater?

Nitrate Well Data



ILRP GOALS

- Protect the beneficial uses of groundwater,
- Minimize waste discharge from irrigated lands,
- Maintain the economic viability of agriculture, and
- Ensure irrigated agricultural discharges do not impair access to safe and reliable drinking water.

Groundwater Monitoring Advisory Workgroup

- Outside Experts
- Groups Represented
- Open Meetings
- Developed ILRP Questions

GMAW Question 1

What are agricultural impacts to the beneficial uses of groundwater quality and where has groundwater been degraded by irrigated agricultural operations?

GMAW Question 2

Which irrigated agricultural management practices are protective of groundwater quality and to what extent is that determination affected by site conditions?

GMAW Question 3

To what extent can irrigated agriculture's impact on groundwater quality be differentiated from other potential sources of impact?

GMAW Question 4

What are the trends in groundwater quality beneath irrigated agricultural areas and how can we differentiate between ongoing impact, residual impact, or legacy contamination?

GMAW Question 5

What properties are the most important factors resulting in degradation of groundwater quality due to irrigated agricultural operations?

GMAW Question 6

What are the transport mechanisms by which irrigated agricultural operations impact deeper groundwater systems? At what rate is this impact occurring and are there measures that can be taken to limit or prevent further degradation of deeper groundwater while we're identifying management practices protective of groundwater quality?

GMAW Question 7

How can we confirm that management practices implemented to improve groundwater quality are effective?

ILRP Groundwater Monitoring

- Trend Monitoring
- Representative Monitoring

Trend Monitoring

- Use Existing Wells
- High and Low Vulnerability Areas
- Monitor Long-Term Trends
- Work Plan

Representative Monitoring

- High vulnerability Areas
- Assess Impacts in a Localized Area (i.e., field scale)
- Monitor Representative Areas so Data can be Extrapolated
- First Encountered Groundwater
- Alternatives to Groundwater
- Identify What Management Practices are Protective of GW

Cooperative Approach

- One Large Program
- Minimize Duplication of Effort
- Cost Savings

Groundwater Monitoring Costs

- Expensive
- Controlled by Many Factors
- Dairy RMP

Representative Monitoring Implementation

- Work Plan
- Monitoring Well Installation and Sampling Plan
- Installation Reporting
- Annual Groundwater Monitoring Results
- Monitoring Report
- Summary Monitoring Report

Groundwater Summary

- Most Programs Implement Individual Groundwater Monitoring
- Representative Monitoring for Programs that have Large Numbers of Sites

Questions ?

